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7. As the figure number increases by 1, the number of squares increases by 1.

The number of squares for figure 1 is $6 = 1 + 5$.

This suggests that we add 5 to the figure number, so the number of squares in figure f is: $f + 5$.

Use figure 2 to check. Since $f = 2$, the number of squares should be $2 + 5 = 7$, which is correct.

So, expression c , $f + 5$, represents the number of squares in terms of the figure number.

8. Create a table.

Size Number, s	Number of Squares, n
1	5
2	9
3	13

As the size number increases by 1, the number of squares increases by 4. This suggests that the number of squares may be four times the size number. So, the equation $n = 4s$ may represent the relationship.

Check whether $n = 4s$ is correct.

When $s = 1$, $n = 4(1)$

$$= 4$$

This is 1 less than the number 5 in the table. So, we add 1 to $4s$ to describe the number of squares correctly. The expression $4s + 1$ represents the number of squares for any size number s .

An equation is: $n = 4s + 1$.

Verify the equation by substituting values of s and n from the table.

Substitute $s = 2$ and $n = 9$ into the equation $n = 4s + 1$.

Left side = 9

Right side = $4s + 1$

$$= 4(2) + 1$$

$$= 8 + 1$$

$$= 9$$

Since the left side equals the right side, the equation is verified.

So, equation c , $n = 4s + 1$, relates the number of squares to the number size.

9. As the figure number increases by 1, the number of squares increases by 2. This suggests that the number of squares may be two times the size number. So, the equation $s = 2f$ may represent the relationship.

Check whether $s = 2f$ is correct.

When $f = 1$, $s = 2(1)$

$$= 2$$

This is 3 less than the number 5 in the table. So, we add 3 to $2f$ to describe the number of squares correctly. The expression $2f + 3$ represents the number of squares for any figure number f .

An equation is: $s = 2f + 3$.

Verify the equation by substituting values of f and s from the table.

For example, substitute $f = 2$ and $s = 7$ into the equation $s = 2f + 3$.

Left side = 7

Right side = $2f + 3$

$$= 2(2) + 3$$

$$= 4 + 3$$

$$= 7$$

Since the left side equals the right side, the equation is verified.

So, equation b , $s = 2f + 3$, relates the number of squares to the figure number.

10. a) To build one house, we start with 1 toothpick then add 4 toothpicks. To build 2 houses, we start with 1 toothpick then add two sets of 4 toothpicks. This pattern continues.
- b) We write the pattern as: $1 + (\text{number of houses}) \times 4$. To build n houses, we start with 1 toothpick then add n sets of 4 toothpicks. So, an expression for the number of toothpicks in n houses is: $1 + 4n$.
- c) When t represents the number of toothpicks, then the total number of toothpicks in n houses is given by the equation $t = 1 + 4n$.
- d) Substitute values of n in the equation $t = 1 + 4n$.
- When $n = 1$, $t = 4(1) + 1$
 $= 5$
- When $n = 2$, $t = 4(2) + 1$
 $= 9$
- When $n = 3$, $t = 4(3) + 1$
 $= 13$
- When $n = 4$, $t = 4(4) + 1$
 $= 17$

These four values match the first four pictures in the pattern so the equation is verified.